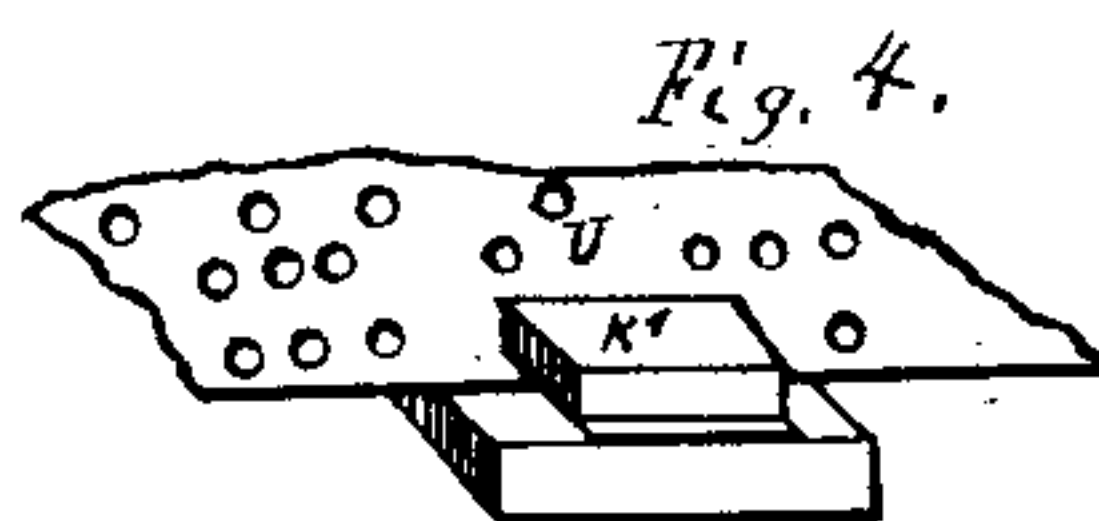
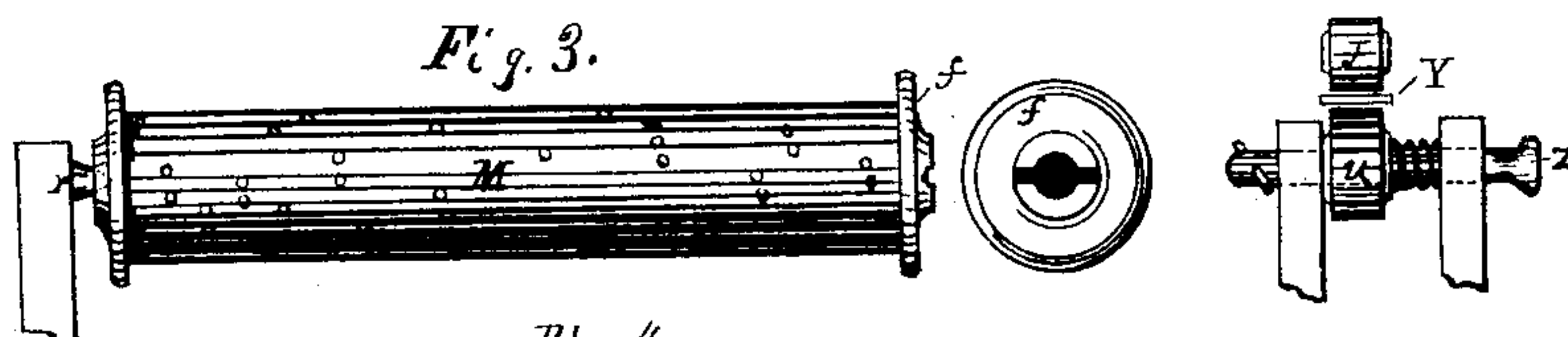
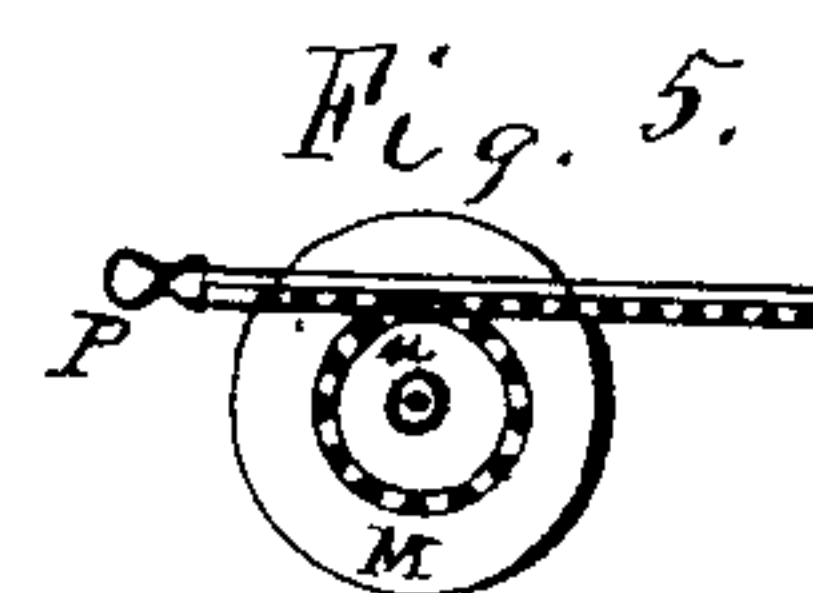
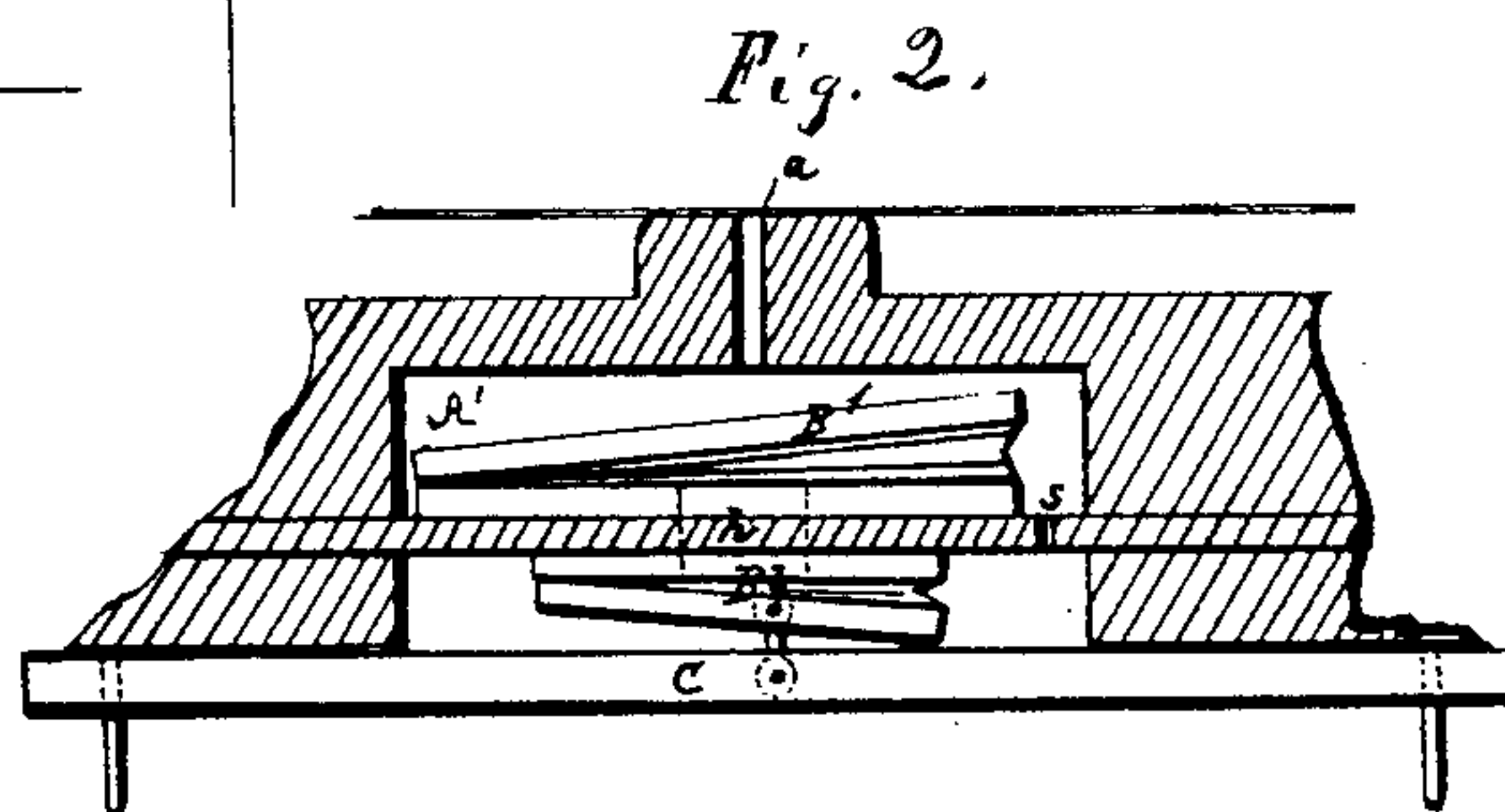
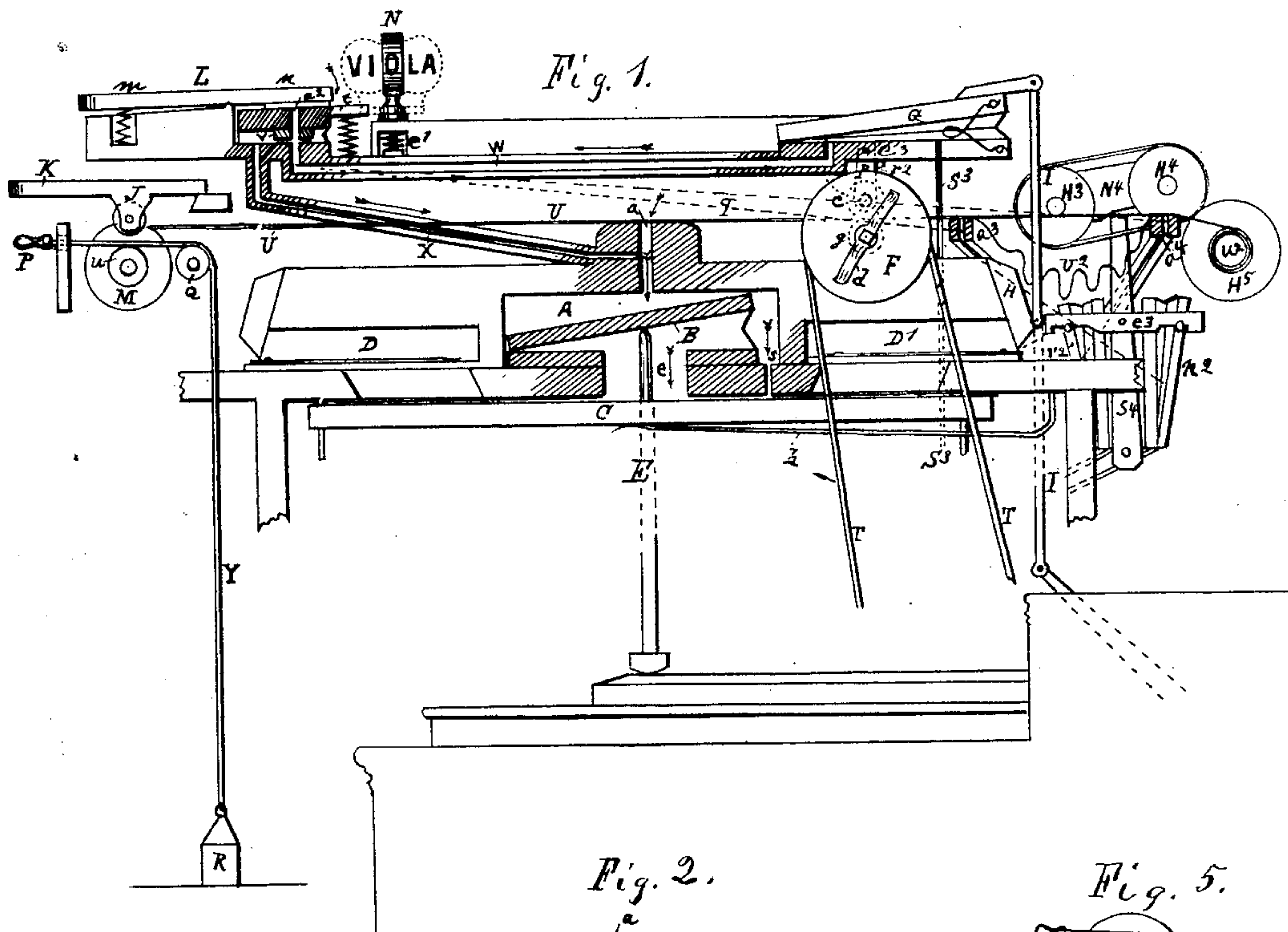


M. GALLY.
Mechanical Musical-Instrument.

No. 222,030.

Patented Nov. 25, 1879.



Witnesses:-
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UNITED STATES PATENT OFFICE

MERRITT GALLY, OF NEW YORK, N. Y.

IMPROVEMENT IN MECHANICAL MUSICAL INSTRUMENTS.

Specification forming part of Letters Patent No. **222,030**, dated November 25, 1879; application filed May 21, 1879.

To all whom it may concern:

Be it known that I, MERRITT GALLY, of the city, county, and State of New York, have invented certain new and useful Improvements in Musical Instruments, of which the following is a specification.

In the accompanying drawings, Figure 1 is a side elevation, partly sectional, of the principal devices of the invention. Fig. 2 is a modification of a part of the mechanism of Fig. 1. Fig. 3 is a front view of the roll of sheet-music and the devices for readily adjusting it to the instrument. Fig. 4 is a modification of the device for retarding the movement of the sheet.

The first part of my invention has reference to the "stops" for bringing into action different sets of sounding devices, or for bringing into operation devices for producing "expression," as the case may be, and is applicable to any kind of musical instrument which may be performed upon either manually or mechanically.

In Fig. 1, N is a stop, lettered in the usual manner, to indicate what part of the instrument is to be brought into action or shut off thereby. Instead of being arranged to draw and push in the ordinary way, this stop turns on a pivot, and when turned toward the performer the letters are in sight, which indicate that the set of sounding devices or expression mechanism represented by the stop is operative. When turned with its edge toward the performer the letters are not in sight, and the parts of the instrument represented by the stop are inoperative. This turning stop N operates in connection with the small lever *t*, and opens or closes the valve V between air-tube W and air-tube X. These air-tubes, when connected, operate the pneumatic stop-key G, which is depressed, holding the shutter H closed, when an unperforated portion of the music-sheet U closes the aperture at *a*, and the finger-key L is not depressed.

Whenever either a perforation in the sheet which represents the stop G H opens aperture *a* or the finger-key L is depressed, the tube W is opened to the external atmosphere, and the exhaust from the main air-chamber E is overcome thereby, and the shutter H is opened. The mechanism is reversed in its action when a pressure instead of an exhaust-current of air

is used. The opening of shutter H renders the set of reeds D' operative.

Any stop or expression mechanism other than the shutter H can be operated by connecting with the operating devices; and I do not, therefore, wish to be limited in my application of the invention.

The pneumatic stop-key G is adapted to be operated by means of perforations in the music-sheet, in order that the stops of the instrument for different sets of sounding devices or for producing expression may be operated thereby; but it is desirable, in order to avoid as much as possible an appearance of set mechanical expression, to be able to introduce any variety that the taste of the performer may suggest. This is secured by the peculiar construction of the finger-key stop L. The finger-key L, when depressed by the finger at *m*, opens duct W at *a*² to the external atmosphere, producing the same effect as that of a perforation in the sheet at *a*. If, therefore, it is desirable to open the shutter H when no perforation occurs in the sheet, the depression of the finger-key at *m* produces the required result.

If it is desirable to prevent the operation of any one or more of the perforations in the sheet which represent this stop, the finger is placed at the other extremity of the finger-key at *n*, and this end of the key being depressed closes the valve V, and the perforation in the sheet is inoperative. Another stop may now be employed instead, if desirable, by operating another finger-stop key at its end *m*. Thus any variety of stops can be substituted for those represented in the music-sheet for any passage, note, or part of a note, as desired. Any one or all of the stops represented in the music-sheet may be entirely shut off for the entire piece of music, if desirable, and only such stops as may please the performer be used when and how he wills by the use of the finger-keys alone. To accomplish this the button-stops N for such keys are turned in the position shown by the dotted outline. In the combination of the finger-key and button-stop N two springs come into action to meet the different required conditions. The spring under *m* keeps the aperture *a*² closed when no pressure is applied at *m*. The spring under *t* is sufficiently stronger than that at *m* to keep valve V open when no pressure is applied at *n*.

When the button is turned upon the lever t in position of the dotted line the valve V is held closed, and renders the music-sheet inoperative through the stop. The shutter H is now held closed by the operation of the air from the main air-chamber E through a very small tube, S^3 , which is always open between pneumatic key G and the main air-chamber, but is so small as not to prevent the return of the key G when the larger duct W is opened to the external atmosphere. If, now, it becomes desirable to operate the stop without turning the button back to its former position, it is only necessary to depress the finger-key at m , which will operate the pneumatic stop-key G by means of aperture a^2 and ducts W and S^3 .

It will be seen from the foregoing explanation that under any of the conditions mentioned the stops are always under perfect control of the performer, and may be opened or closed at will by the touch of the finger-keys. This part of my invention enables any one having a cultivated ear for music to render a piece with any desirable expression, while the notes are produced mechanically, and as expression is the most important thing to be attained, and very little skill is required to be able to manipulate a few stop-keys, the music, although performed upon a mechanical instrument, may be always in quality equal to the taste of the performer.

By the use of similar keys any of the perforations in the music-sheet which represent the notes may be rendered operative and inoperative at will, or additional notes thrown in, to suit the taste of the performer.

The second part of my invention consists in a peculiar construction of the key-action connected with the reed-valve, and a modification thereof, as shown, which I will not claim herewith, but reserve for another application.

The third part of my invention consists in an improved construction of the spool or roller for the music-sheet and its connection with the instrument.

In Fig. 3 the spool of sheet-music is represented as having a bearing at one end on a center-point, in order to have as little friction as possible. In the right-hand end of the spool, as shown, is a small hole, across which is a groove sufficiently large to take in a stop-pin. The journal is shown removed to the right for clearness of illustration. The end of the journal is slightly rounded or tapered, in order that it may readily enter the hole in the end of the spool or roller, and through the journal or near its end is a pin which enters the cross-groove and secures the turning of the spool. The journal has a sliding movement right and left, and is furnished with a spring and a draw-knob, Z .

To place the spool on its journals, the knob Z is drawn back and the spool placed upon the center-point, and then brought into line with the sliding journal, which is allowed to return to place and enters the end of the spool.

The fourth part of my invention consists in a device for drawing back or rewinding upon the music-roller any part or the whole of the music sheet or strip without the use of the motive power which propelled the sheet forward. If the driving-wheel F , which propels the sheet and operates the instrument, is driven by pedals it is desirable to be able to take advantage of any opportunity which may be presented for resting the feet.

If it is desirable to repeat any passage in the music or recall any portion of the music-sheet which has been unwound from the music-roll M , the operating-pedals of the instrument may be stopped, relieving the feet for the time required to return as much of the sheet as desired, employing the hands for the purpose.

To accomplish this I attach to the journal which supports the music-roll M a wheel, u . Over a pulley, Q , I pass a belt or cord, Y , to which is attached a handle, P , at one end and a small weight at the other, the weight being sufficiently heavy to draw back the belt after it has been carried forward by means of handle P . The belt Y passes above the wheel u , but does not of itself produce any friction upon it, being held in a line slightly above it by the position of pulley Q .

On the side of the belt opposite that of wheel u , I place a device, J , for producing friction of belt Y upon wheel u . This device, as shown, consists of a lever, K , and friction-wheel J .

If it is desirable to recall any portion of the music-sheet which has passed from the roll M , it is only necessary to press upon lever K with one hand and draw upon the handle P with the other.

By relieving the pressure at K the belt will return to place without moving the music-roll, and is ready to be redrawn, if necessary. The music sheet or strip is very narrow, and requires only a very slight power for propelling it.

The feed-rollers c g are arranged to touch the sheet very lightly, which produces friction sufficient for drawing it forward. This is easily overcome by the power applied for recalling the sheet. I also drive the feed-roller g by means of slipping device d on the wheel F , differing from that of my patent of November 26, 1878, only in the fact that the slip may remain continuous for any length of time. The slipping device d of the driving-wheel F is adjusted to drive roller g with only sufficient power to carry the music-sheet forward. The motion of the sheet may therefore be easily arrested or the sheet returned without injury to the fabric.

If it be necessary to relieve the perforated sheet or strip, more than already explained, from the friction of the feed-rollers c g , I pivot the roller c to a drop, p , which is pivoted above at c^3 . When the sheet or strip is not drawn backward the roller c presses on the strip, the drop being drawn by the action of the sheet or strip against a stop, r^2 ; but when the sheet or strip is drawn backward it

carries the roller *c* away from roller *g*, and then it bears with only rolling friction. This forms a self-adjusting device.

I use the friction device *K J* not only for the pull-back, but also for arresting the sheet to hold onto a note, or for producing a rest not represented in the sheet, or for retarding the time of the music, as the case may be.

In Fig. 4 a piece of the music-sheet is shown with a friction device, which is brought to bear directly upon the music-sheet for stopping or retarding its movements. By placing the finger upon the presser *K'* the movement of the sheet may be stopped or retarded at will.

In recalling any part of the music-strip for repeating any part of the music, whether the return movement is produced by the motor of the instrument or by the hand, it is necessary to be able to recall just the part desired, so that the mechanical repetition will begin at the proper place in the music. I accomplish this by having the take-up roll *u*² take up the music-sheet at intervals instead of continuously. Between the passages and strains of the music, in such parts as judgment may dictate, I place in the music strip or sheet a perforation, depression, elevation, or equivalent, which will operate a mechanism for stopping and starting the take-up roll, or otherwise measure off the music-sheet into definite parts, which may be mechanically controlled. The take-up roll does not constantly keep the sheet taut between itself and the feed mechanism, and may be driven either positively or by means of a slipping driving device, at pleasure.

In Fig. 1 the mechanism for collecting the music-strip and starting and stopping the take-up mechanism at intervals is represented as being pneumatically operated; but, as before intimated, it may be otherwise mechanically operated.

In Fig. 1 the music-strip *U* is shown as having a portion of it collected at *U*², between feed-rollers *c g* and take-up roll *u*². This collected portion of the sheet represents a complete strain or passage of music; or, speaking more exactly, the strain or passage to be repeated, and which has last traveled through the feeding mechanism, if drawn back until the music-strip is taut from the take-up roll, will be in proper position to begin the repetition. While drawing the sheet backward I prevent the sounding of the instrument by rendering the pneumatic key-action inoperative, thus saving the wind of the bellows for a prompt start.

The mechanism which automatically starts and stops the take-up mechanism at proper intervals operates as follows: Perforations are made in the sheet, dividing its length in proper parts to correspond with the required intervals. These perforations pass over the apertures of ducts *a*³ and *a*⁴ and operate the pneumatic tripper *e*³ *S*⁴. The pneumatics *r*² *n*² have a spring return movement, which may be substituted, if desired, by weight. These pneumatics are shown as being exhausted from the

main air-chamber. If a pressure-current of air were employed their action would be reversed, and it would only be necessary to reverse their action on the tripper *e*³ *S*⁴. As shown in the figure, a perforation in the sheet at the aperture *a*³, operating through pneumatic *n*², drops the beam *N*⁴, which vibrates on shaft *H*³ and brings the wheel *H*⁴ to bear upon the motor-wheel *H*⁵ of take-up roll *u*², and starts it in motion. *H*³ is the driving-motor, and may connect through belt, tooth, or friction gear, with the take-up roll, but is shown with a belt and friction connection. When the perforation reaches the aperture *a*⁴ an opposite movement of the mechanism is produced through pneumatic *r*², and wheel *H*⁴ being lifted from connection with *H*⁵, the take-up is stopped in its action until another perforation occurs at *a*³. During this interval the music-strip is collected, as shown at *U*². In order that these intervals of stopping and starting the strip may be under the control of the performer, so that he may collect more than the length of a single division of the sheet as marked by the perforations, or subdivide at his pleasure, I connect the apertures *a*³ *a*⁴, or other convenient parts of the tripping mechanism, with the expression-keys *L*, or an additional finger key or keys, as the case may require, as shown by the dotted lines *q*.

I use any or all parts of my invention as described, not only as forming a part of a mechanical musical instrument, but also to be applied to musical instruments of different make and variety, or as a mechanism for performing upon any ordinary instrument. The devices of Fig. 1 are shown as placed over the finger-key board of an ordinary manual instrument, and a striker in position for operating the key of the finger-board, the connection being shown by the dotted lines. The connection for one of the stops is also shown at *I*.

The mechanism of my invention can be readily applied to operate more directly upon the sounding devices of the instrument to which it is auxiliary than through the keyboard, and I do not wish to limit myself in the manner of its application. The mechanism of the invention may be connected for its motive power to the foot-pedals of the instrument, or to separate foot pedal or pedals, or be driven by hand-crank or any other motive force, in which I do not wish to be limited.

The devices for stopping or retarding the movement of the music-sheet are to produce variety of effect in the rendering of the music by means of pressure of the hand at *K* or *K'*, and not as a constant binding friction for steadying the music-roll.

It is not necessary that the portion of the sheet which is recalled for repetition be re-wound on roller *M* unless it be preferred. It may be collected in similar manner, as between *a*³ and *a*⁴.

By using similar collecting mechanism or take-up mechanism at a position in front of the tracker-range of the pneumatic key-action

to that shown in its rear in the figure, the sheet may be withdrawn part by part, any number of which, being under the control of the performer, can be counted by the action of the finger-keys without using the sight or necessitating any acquaintance with the character of the perforations, the performer being wholly guided by ear as to the music passed through, and controlling by the touch the amount withdrawn for repetition.

For convenience in illustration I have shown the flanged delivery-roller as permanently attached to one end of the music-sheet or strip, and a plain take-up roller permanently attached to the other end of said sheet; but I shall not claim this particular combination, as it is not new.

What I claim as my invention is—

1. In a mechanical musical instrument, or a device for performing upon musical instruments, the combination, with a perforated or other music-sheet adapted to operate the stops or expression devices of the instrument, of finger-keys for varying the effect of the stops or expression devices from that indicated by the music-sheet.

2. The combination, with a stop, of a finger-key constructed to perform two operations for reversing the ordinary condition of the stop when said stop is either open or closed.

3. A music-sheet roller or spool, in the end of which is a central socket for receiving the end of a driving-journal for centering and supporting the roller, and provided with a clutch to cause the roller to revolve with the journal.

4. In a mechanical musical instrument, or an attachment for operating or performing upon musical instruments, the combination, with a music-sheet roller or spool, in the end of which is a central socket, of a center point or journal which centers and supports the roller in the instrument, and has a longitudinal movement to allow the roller to be removed from the instrument and replaced or exchanged for another.

5. The combination, with a perforated or other music-sheet for mechanically performing upon musical instruments, of feed-rollers driven by a slipping device, which is adapted to allow the extent of slip to be varied or controlled at the will of the operator for any desired duration of time.

6. The combination, with a perforated or other music-sheet for mechanically performing upon musical instruments, of a pull-back device for the return movement or rerolling of any portion or whole of the music-sheet, substantially as specified.

7. The combination, with the pull-back, of the pressure-lever for rendering the pull-back operative or inoperative, as required.

8. The combination, with a music-sheet and its driving mechanism, of a friction device for stopping or retarding the motion of the sheet, for retarding the time of the music, or producing a hold or a rest, at the will of the performer.

9. A friction device for stopping or retard-

ing the ordinary movement of the music-sheet independent of the motor of the instrument, and acting either directly or indirectly upon the music-sheet.

10. The combination, with a pull-back or a rewinding mechanism, adapted for recalling for repetition any portion of a perforated or other music-sheet, of mechanism for securing the discontinuance of the recalling movement at the proper place for beginning the repeat.

11. The combination, with a perforated or other music-sheet, of a repeating mechanism adapted to be controlled by means of finger-keys.

12. The combination, with a perforated sheet or strip in which the perforations are made to represent sounds, of a feed mechanism for propelling the sheet or strip, which is rendered inoperative by the friction of the sheet whenever said sheet commences a return movement.

13. The combination, with a perforated sheet or strip in which the perforations are made to represent sounds, a feed mechanism, and a driving mechanism therefor, of a recalling or a rewinding mechanism which is independent of said driving mechanism for its action.

14. The combination, with a perforated sheet or strip in which the perforations are made to represent sounds and a feed mechanism, of a movable support for the presser-roller, adapted to relieve the rollers of the feed mechanism from their feeding-pressure, by means of the friction of the sheet in its return movement.

15. The combination, with a perforated or other music sheet or strip and a feeding mechanism, of a take-up roll operated at intervals by or through the means of the music sheet.

16. The combination, with a music sheet or strip, of an interval take-up mechanism adapted to be controlled by the performer, in order to change the intervals of movement at will from those automatically produced by the music-sheet.

17. A perforated or other music sheet or strip adapted to act mechanically or automatically upon a take-up mechanism at intervals of movement of the sheet.

18. The combination, with a feeding mechanism for a music-sheet, of an interval mechanism adapted to limit the return movement of the sheet when any portion thereof is recalled for repetition.

19. The combination, with a music-sheet and a take-up mechanism, of a finger-key or finger-keys for controlling the take-up mechanism as to its intervals of action, substantially as specified.

20. The combination, with a music-sheet, of a take-up mechanism controlled as to its intervals of operation by means of a pneumatic action, substantially as specified.

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